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BEES

By E. R. Root

When the fierce northwestern blast
Cools sea and land so far and fast,
Thou already slumberest deep.
—Emerson

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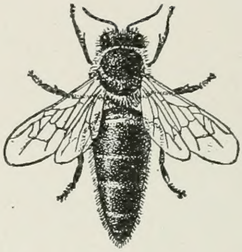
CUNNING BEE

Said a little wandering maiden

To a bee with honey laden,

"Bee, at all the flowers you work,

Yet in some does poison lurk."



Queen

Worker

"That I know, my little maiden,"

Said the bee with honey laden;

"But the poison I forsake,

And the honey only take."

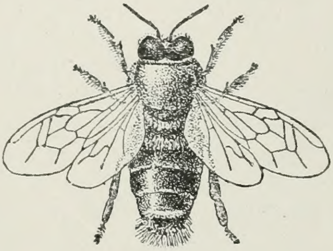
"Cunning bee with honey laden,

That is right," replied the maiden;

"So will I, from all I meet,

Only draw the good and sweet."

—Anonymous



Drone

BEES

By E. R. Root

Let us turn to the United States census figures for the year 1910. Here we shall see that bees are credited with producing $10,000,000 worth of honey and $2,000,000 worth of wax in a single year. But it was possible for the census enumerators to get track of only about half the amount of the grand total. A conservative estimate based on reliable data shows that honeybees should be credited with not less than $25,000,000 worth of honey and beeswax. But as the average person can not comprehend what this means, suppose we load all this honey into 40-foot freight-cars holding 30,000 pounds each. These cars, if placed end to end, would make a solid train over fifty miles long. So the little bee is not so little as it might at first seem.

There are in the United States in the neighborhood of one million persons who keep bees. There are perhaps one thousand whose annual crops run up into the carloads, and probably 5,000 who make beekeeping a means of livelihood.

At the outset we spoke of the fact that bees produce approximately $25,000,000 worth of honey and beeswax in a year; but the great economic importance of the little bee should not be measured altogether by the honey and beeswax it produces, but rather by its indirect contribution to horticulture. The bee is the chief and almost the only agent for the pollination of fruit-trees and certain farm crops. Without bees there would be less and poorer fruit. Albert Repp, of the famous firm of Repp Brothers of New Jersey, who produces apples by the carload, says:

"I'd as soon think of managing this orchard without a single spray-pump as to be without bees. I've got fifty colonies now and am building up the apiary each year."

Mr. F. A. Waugh, author of "Apple Culture" and an acknowledged authority on apple-growing, says that bees are practically the only agent for the pollination of fruit-trees; that while some varieties are self-pollinating, even these varieties will produce more and better fruit when bees are present.

Van Rensselear & Southam leased an old orchard of some forty acres near Cleveland, Ohio. This orchard had yielded almost no returns to its owner. The lessees began to prune and spray the trees, and then asked to have fifty or sixty colonies of bees put on the place, for they said that without bees they could not grow fruit to advantage.

This was done. In the fall of 1913 they harvested 16,000 bushels of apples, and the bees, they said, played no small part in producing that magnificent crop.

The cranberry-growers of Cape Cod, Massachusetts, have discovered within the last year or so that they are enormously increasing their crop of cranberries by putting bees within reach of the vines, and they find that the yield is almost in proportion to the number of bees in the vicinity. The growers, instead of depending on wild bees, are now buying their own bees and distributing them over the bogs.

If space permitted, we could introduce statement after statement from prominent fruit-growers and horticulturists, all testifying to the important part played by bees, not only in producing more and better fruit, but also more and better seed from the clovers. If, therefore, the bees contribute $25,000,000 directly in honey and wax, indirectly they probably contribute to the wealth of the nation ten times that much in the production of better crops of fruit and seed.

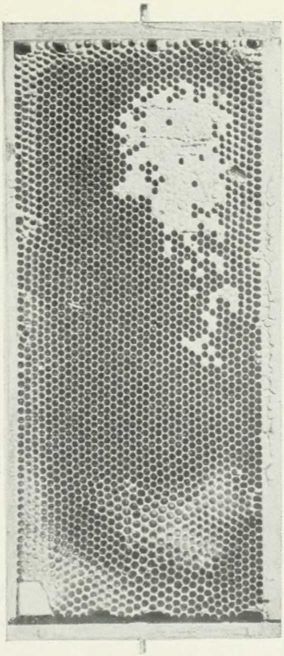
Honey as a Food

Starting on the basis that there is $20,000,000 worth of honey produced annually in the United States, the question will naturally arise, "Where does it all go?" Many people rarely taste honey, and many more use it only occasionally. Who eats this enormous amount? Some people will claim they never eat honey; but, as a matter of fact, they probably eat it every day in cakes and cookies which they buy at the bakery. The large baking concerns of the United States use hundreds of carloads of honey. This is used in varying quantities in a large variety of cakes and cookies. What are called "honey-cakes" contain, of course, a large per cent. of honey, and such cakes will keep almost indefinitely, while other cakes in which no honey but ordinary molasses or sugar is used soon become so dry that they are unpalatable. A honey-cake, on the other hand, seems to improve with age, and the more honey used in it the longer it will keep. Honey-jumbles, for example, have been known to keep in excellent condition for nine years.

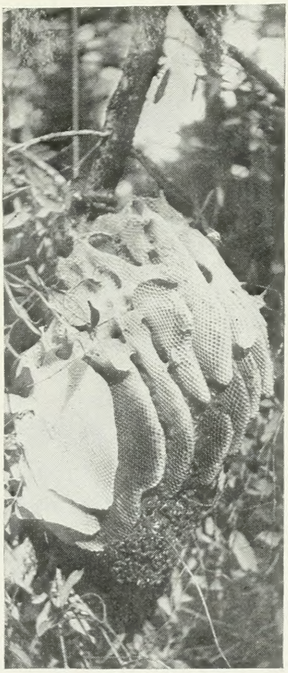
The Many Flavors of Honey

Some have the impression that the honey they buy at the local grocery is adulterated because it does not taste like that which they used to get on the farm away back in the olden days. The fact is, there are as many flavors of honey as there are of fruit. Orange honey partakes of the pleasing aroma of orange trees when in bloom; clover, of the clover-blossoms; buckwheat honey, which is almost black in color, tastes exactly as the blossoms in a large field smell. Honey from onions will be strongly suggestive of the onion flavor; and so we find that the many different flavors in honey correspond to the odors of the blossoms from which the nectar was taken.

There are some years when clover-fields in the East yield no nectar. The result is that the honey merchant will import many carloads of Western honey, chiefly mountain sage and alfalfa. If one is familiar with the flavor of honey from the Eastern States, he may come to the conclusion that the honey offered him by his grocer is adulterated or manufactured. While both mountain sage and alfalfa have delicious flavors, the very fact that they are "different" creates suspicion.



A movable comb from a modern hive. The cells at the bottom are drone cells; the rest are worker cells. The white patch is filled with honey and capped over.



A swarm that has built combs to the limb of a tree. These cases are very rare but they are interesting as they show how bees build a set of combs approximating a sphere.

Manufactured (?) Comb Honey

Twenty years ago there was quite generally circulated a story to the effect that the attractive comb honey seen in little square boxes was manufactured. It was claimed that the combs were made of paraffine, "filled with glucose, and capped over by the use of machinery." This canard was repeated so often that it found place in the daily press, in our dignified magazines and more serious cyclopedias that are supposed to tell nothing but the truth. The fact is, there never was on the market such a thing as manufactured comb honey. There are mechanical reasons why it cannot be made. So persistent were these falsifiers that finally a beekeeper of strong financial standing offered $1,000 reward for proof that combs were manufactured. This offer was later increased to $10,000; and notwithstanding that it was published in many of the large dailies, no one ever came forward with the proof. It may be safely assumed that every box of honey is the genuine product of the hive, and that all liquid honey in bottles is likewise pure honey, as our state and national laws prohibit adulteration.

Granulated Honey

About the beginning of cold weather, liquid honey will often granulate. These granules suggest the presence of brown sugar, which they resemble, and, naturally enough, the housewife concludes that the honey is adulterated. As a matter of fact, granulation is one test of purity. A honey containing a larger per cent. of glucose will not granulate.

A granulated honey can be restored to its original condition by the application of a mild slow heat, but care must be taken not to injure its flavor.

A Modern Beehive

Having considered the economic importance of bees to mankind, and having taken into account the amount of honey produced and its uses, we should consider the kind of house that the bees live in. In nature bees seek hollow trees in the woods or crevices in the rocks. Some of these natural abodes will contain many hundred pounds of honey. As long as bees have room they continue to store an amount far in excess of what they can possibly use, which shows that, when conditions are favorable, they have a capacity for gathering enough for their own use and a considerable surplus for their owner. It is on this account that beekeeping has assumed such a commercial importance that it may now be ranked as one of the great pursuits of the world.

Bees may be housed in a nail-keg, in a rude box, or in a half-barrel; and they will probably store as much honey in any one of these as they would in any modern hive of equal capacity. But boxes and nail-kegs are not adapted to the convenience of bee owners. While there might be 100 or 200 pounds of honey stored in a half-barrel, it would not be in marketable condition. And that is not all. In order that the bees may yield the largest return in money, itis absolutely essential that the internal condition of the hive be known.

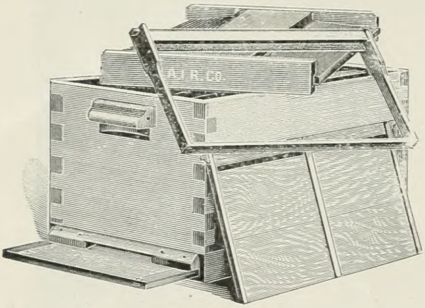
In 1851 the Rev. L. L. Langstroth, a native of Ohio, invented a hive that makes it possible for us to determine accurately the condition of a colony, and at the same time secure a product that will be in marketable condition. The value of his invention rests primarily in the possibility of removing with perfect ease any comb in the hive, and returning it to the place whence it came, or to another part of the hive, or to any other hive. This is accomplished by the use of a frame or rack (to hold the comb) enough smaller than the inside dimensions of the hive to leave a clearance of from ¼ to ⅜ inch all around the frame. This ¼ or ⅜ space is technically called a "bee-space." When a comb is built in one of these frames, the bees will make no comb attachments in the bee-space outside of the frame, because they

A PART OF A MODERN APIARY.

A good colony of bees in the honey gathering season will need more room in which to store honey. This is given by putting on top from time to time additional hive sections or supers. Some colonies do so well that their hives grow to be miniature sky scrapers at the close of the season. In the picture above there is one colony that is only two stories high while some of the others are four and five stories high. This apiary is an example of good management and a good season. Not every year will show such good results.

need that room to go around it; but if the space between the frame and the hive is anywhere from ½ to several inches, such space will be filled. Langstroth's great invention then consisted in the discovery of the fact that bees will not fill up a space from ¼ to ⅜ inch. Taking advantage of this, he made a hive that contained a series of frames in which the bees built their combs. These frames are suspended by projections of the top-bar so that they hang a bee-space apart and a bee-space from the inside of the ends, the top and the bottom of the hive.

It is thus possible for the bees to go all around the combs. If they built any comb attachments, or built any combs between the frame and the hive, it would stop up their passageways and at the same time interfere with the removal of the frame. Langstroth's discovery of this bee-space has made it possible for the modern beekeeper to have an accurate knowledge of each one of his colonies, so that he can apply remedial treatment whenever necessary.



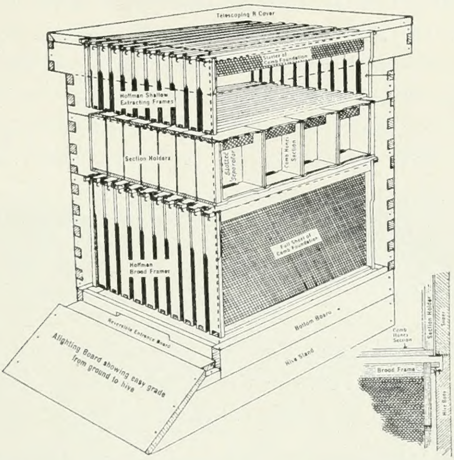
A modern Langstroth hive.

A Bee Veil.

Let us suppose a few cases. Here is a colony that is weak. Here is another that is too strong. The owner can take a frame of young bees and honey from the strong and give it to the weak. In the course of a month or so he can, by this means, equalize the strength of all the colonies in his apiary, so that every stock will be just right to gather the honey when clover comes into bloom along about the first or middle of June in our Northern States.

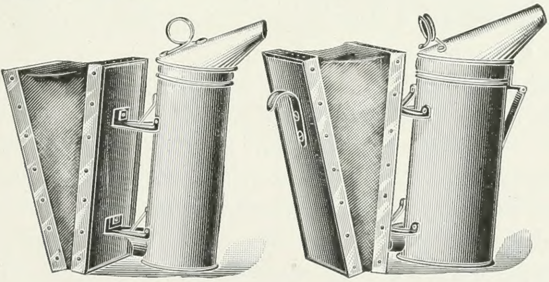
This invention also makes it possible for the intelligent beeman to weed out his poor queens and to use the best ones. His success will depend largely upon the quality of the queens. When, therefore, he can clean out the scrub stock, and use only the very best, his chance of success is very greatly enhanced. But the Langstroth invention goes still further. When these movable combs are filled with honey, they can be taken out and sold and later be cut up by the housewife for her table. Or they may be placed in a machine known as a honey-extractor. This is the invention of Count Hruschka of Austria. Two or more combs are put into one of these machines and the honey is extracted by means of centrifugal force, after which the empty combs are put back into the hive, uninjured, to be filled again by the bees. The honey taken with the extractor is called "extracted honey."

In order to control the bees further, the beemaster has what he calls a smoker. This consists of a small bellows attached to a little tin stove with a spout on the end. A blast of air is forced from the bellows into the stove containing some slow-burning fuel—a fuel that will make smoke and not flame. A few whiffs sent over the colony of bees quiets them. If their owner proceeds carefully and avoids all jars or bumps, he can remove frame after frame of comb, and examine the



X-ray view of modern hive, showing the general arrangement for holding the frames and honey-boxes or sections.

It is customary to put the hive up on a hive-stand, which, in this case, provides an easy grade for the incoming bees laden with honey to crawl up from the ground into the hive. The frames have projecting ears that rest in corresponding rabbets in the hive, as shown in the lower right-hand cross-section.



Two sizes of the modern bee-smoker.

bees without danger of being stung. As a general precaution, however, he supplies himself with what is called a "bee-veil." This may consist of wire screen, but is generally made of mosquito-netting, black Brussels netting, or grenadine. It is made in the form of a bag without top or bottom; a rubber cord is inserted so that the top of the bag will fit around the crown of the hat, while the bottom will come tightly around the neck and shoulders. In the case of a beginner, bee-gloves are sometimes used, although rarely employed by the practical apiarist who is familiar with the use of a bee-smoker and the general habits of bees. By the use of these modern tools and appliances, one can work with bees day after day, learn the exact condition of the hive, take away the honey, and yet not receive a single sting.

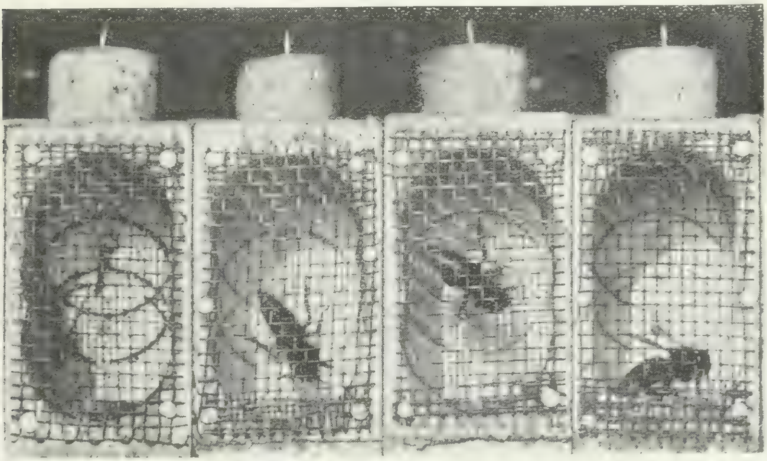
Some suppose that bees are always in a towering rage, ready to attack any one who may presume to molest their private domicile. This belief is doubtless based on some experiences with a bumble-bees' nest; even these clumsy insects can be handled with smoke, and likewise the supposedly fiery yellow-jackets; but an ordinary hive of bees; especially those of the yellow or Italian races, is much more tractable than either. In fact, one who knows how to handle them can pick them up by the handfuls and play with them as one would with kittens. But no novice should undertake this trick of the trade, for a false movement on his part may result in his receiving some stings.

The Domestic Economy of the Hive

There are three classes of individuals in every hive—the worker bees, or undeveloped females; the queen, or true female; and the drones, or males. Only one queen at a time is, as a rule, tolerated in a hive. If by chance a strange queen gets into a hive where there is already a queen, there will be a battle royal, resulting in the death of one. Mother and daughter may for a time get along quite peaceably, but never mother and daughter-in-law; and their subjects, the workers, apparently have something to say about the matter also. In modern bee culture it sometimes happens that the mother dies. The bees set up a cry of distress. They are out of sorts with themselves and their owner. The prospects for the future are decidedly bad; the old bees begin to die off; and unless there is a queen to lay eggs and keep the young brood going, the colony itself will soon become extinct. Here the beekeeper steps in and supplies a queen. He cannot let loose this step-mother into the hive, even though the inmates be "crying" for want of her. He must go through the preliminary process of "introducing" her. This is done by shutting her up in a little cage supplied with soft candy. She is then placed between the combs for 24 or 48 hours, during which time she acquires the odor of the colony.

She is no longer a stranger, and is released among the bees. If she be "accepted" by them, they begin to feed her by extending their tongues, offering her a drop of honey or nectar. Other bees will begin to comb her hair. They will stand around her in a circle three or four bees high, perhaps. At times they extend to her all the royal attention that a human queen might expect from her subjects.

The new mother will shortly begin her duty of laying eggs, and she may lay as many as 5,000 a day, but usually not more than several hundred. In three days from the time of laying, these eggs hatch out into tiny "worms," or larvae. In a few days more these larvae spin their cocoons, and in twenty-one days from the time of the laying of the eggs, young baby bees hatch out. These young bees soon begin to take care of their baby sisters, build combs, and guard the entrance of the hive against robber bees. When they are about a week old, they will have their play spells cavorting in the air in front of the hive. Later they go to the field in search of nectar or pollen. The work of the hive is divided between the young bees or nurses that do not go to the field, and the old bees, or fielders, that gather nectar or pollen. The average life of the worker bee in the height of the season is about six weeks. At the end of that time their wings may become so worn that they are no longer able to work. Notwithstanding that they have toiled and spent their life blood, the younger generation of bees coming on will, without the least spark of gratitude, push these old bees out of the hive, pick them up, fly out into the field with them, and drop them.



BABY QUEEN-BEES IN NURSERY CAGES.

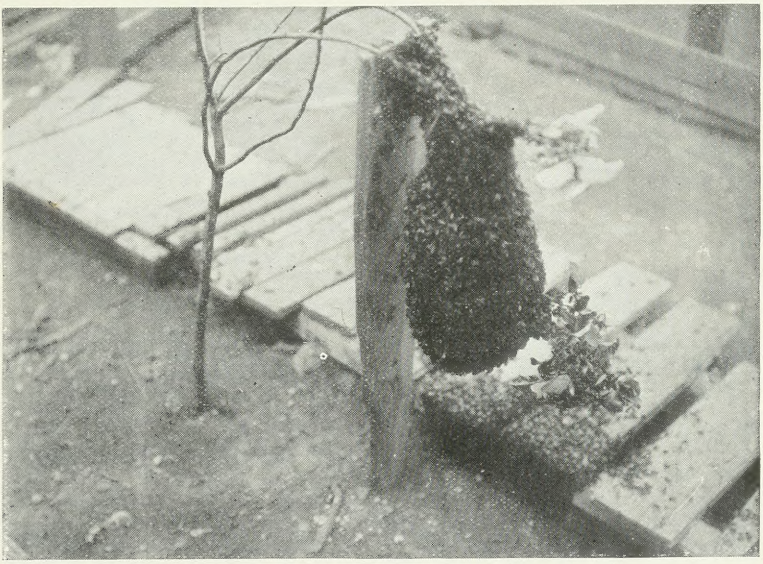
In modern queen-rearing the queens are confined in cages to keep them from destroying each other. Under normal conditions there is only one queen to the hive. When the old mother dies, the queen will raise several baby queens. The oldest or strongest, unless prevented, will sting to death all rivals.

The poor old bees can not walk back—it is too far; and they can not fly, and so they die. The merciless process is repeated generation after generation. It is another case of the survival of the fittest. All undesirables and the weak and infirm must be sacrificed for the good of the colony at large. Even the drone bees, after they have served the purpose of their creation, and after the close of the season, are ruthlessly pushed out of the hive by their young sisters. They gather neither pollen nor nectar, so why save them? They, too, must be sacrificed, for winter is coming on, and only the essential must be allowed to survive.

The statement has been made that the young bees guard the entrance—against what? Robber bees. Bees, like their owners, learn that they can steal from their neighbors. The ordinary honest bee will, perhaps, spend anywhere from two to three hours, or even half a day, and possibly a whole day, in the fields gathering a single load of nectar. This, of course, means hard work. If, however, the beeman leaves any honey or syrup exposed, or if a certain colony is not very strong, when there is no honey in the fields, these honest bees may become thieves. They will overpower a weak colony. They will steal the syrup or the honey, and in a short time there will be a general pow-wow of excitement. Every bee, anxious to store for its own hive, will pounce on these coveted sweets. It takes a robber bee less than a minute to fill up with honey, rush back to the hive, deposit its load, and then rush back with a lot of its fellows. The excitement grows apace. If the apiarist is not on hand to stop proceedings, the whole apiary will be involved. When the honey is gone, there is trouble. Becoming excited and angry because there is no more, they are liable to wreak their vengeance on cats, dogs, chickens, or on pedestrians and teamsters in the highway. The wise apiarist, if he comes upon the scene in time, will remove the hive, and if a weak colony is being overpowered, will carry it down cellar. He may go even so far as to set a robber-trap. This device allows the bees to go into a hive that is set as a decoy, but permits none to get out. In half an hour he may catch all the robber bees, amounting to some thousands. After their wild excitement, he knows that he must shut them up for a day or two or until they cool off. Or he may destroy them, for once a bee learns bad tricks it will keep them up.

Fortunately, these robbing episodes are not frequent, but are here mentioned to caution the novice against leaving sweets exposed or allowing colonies in the apiary to become so weak that they will be overcome by their more powerful neighbors.

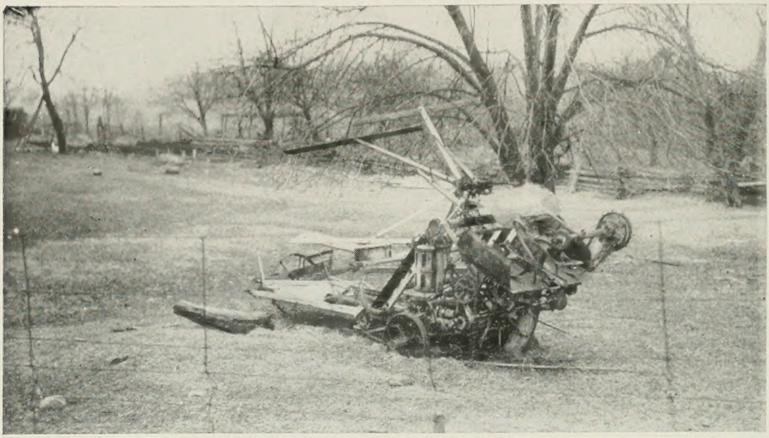
The last question that will arise in the minds of teachers and their pupils will be whether they can keep a few bees at their homes, to produce the finest of all sweets in the world, and at the same time gain a wonderful insight into the life and habits of these industrious insects. There is no more interesting and valuable nature study. One can usually procure a colony or two of bees from some farmer at a cost of from three to five dollars. If they are handled intelligently, they will yield in revenue almost their purchase price in a single fair season. Thousands of persons are keeping a few hives of bees year after year in a small way in their back yards or vegetable gardens. We say "in a small way" because the earning power of a colony will decrease somewhat in proportion to the number of bees kept in a locality. In other words, five colonies of bees will gather proportionately a larger quantity per colony than one hundred. When a child goes out to pick berries in a garden he can pick a good many more quarts if he has the whole patch to himself than if there are a dozen other children who are picking at the same time. In the same way, five colonies, to carry out the figure, will have "better picking," because they will have practically the whole field to themselves, than if they had to compete with ninety-five other colonies. There are but very few places in the United States that are overstocked with bees, and so nearly every one can keep a few bees to advantage—a direct benefit to himself and a still greater benefit to the community at large.



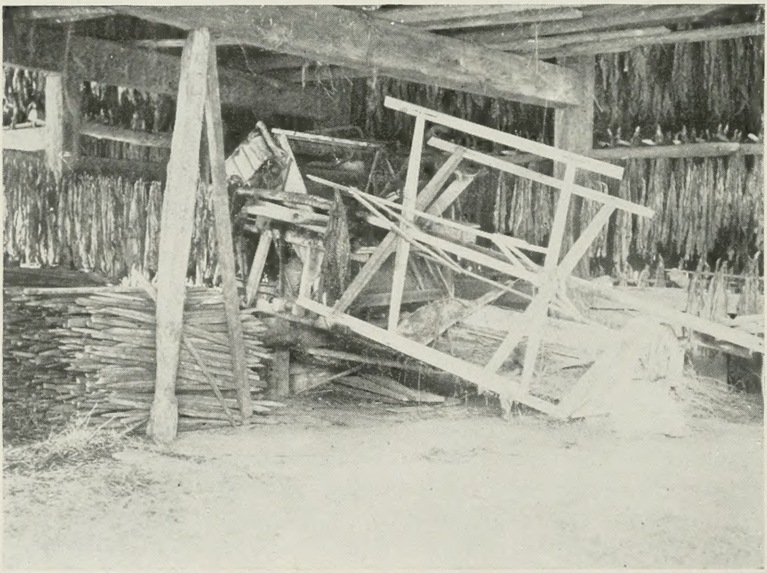
A SWARM THAT HAS CLUSTERED ON A SMALL TREE.

Stray swarms will often alight on small trees or bushes, as well as upon limbs of large trees. They will sometimes settle upon fence-posts or even on the grass. In the position here shown it will be very easy to hive them.

PROFIT AND LOSS ON THE FARM



Ready for the junk-pile after five years of service.



Care + $12.50 = 25 years of service.

FARM LOSSES

Thousands of dollars' worth of farm implements rust out every year because no care is given to putting them away properly or protecting them from exposure to the weather.

It has not been many years since the frames for harrows, grain harvesters, and a few other farm implements were made of wood. Today nearly the entire implement or the parts that must be strongest are made of steel. When these implements were made of wood many could be seen rotting to pieces, or after more years of exposure than use, they were knocked to pieces to feed the kitchen fire. But now that they are made of steel, after an exposure of ten or twelve months each year, they become a part of a great junk pile.

Where may one look to find such a show of negligence? As one goes along any country road there can be seen in the middle of winter a corn plow just where it was left at the end of the field at the close of a warm June day. If it is ever used again, is it strange that the shovels will not scour?

Here is a roller with a tongue pointing upward over a fence, and there a harrow over which the grass has woven a soft cover; folded and abandoned, it stands for ''Absence of owner and care'' like an A of a nursery rhyme. The hay-rake or the hay-loader is in the open meadow or at the edge of the woodlot waiting for the haying time to come again. The farm wagon and wheelbarrow in the barn lot share alike the alternations of rain and shine. On a picket fence a rusty bladed hoe and a dirty rake, and against it a rust reddened spade remind one that once a garden was at least begun. The binder left where the last sheaf was dropped and the mower at the end of the last swath speak loudly of the indifference of the land owner as to sufficient shed room, or of the thoughtlessness of the owner of the implements.

Is it necessary foryou to imagine a farm yard picture in which there is an assembly of implements under the shade of a walnut or an old apple tree, or can you see such a scene day after day on the road to town or school?

Oil will usually prevent rust. Shelter for the implements and oil for bearings and the exposed surfaces of metal, such as the moldboard, shovels, etc., are things which must be provided.

Stop just a moment and calculate how many days each year a self-binder is used. Make a calculation as to the time other expensive implements are used each year. Make a table of the cost of each one.

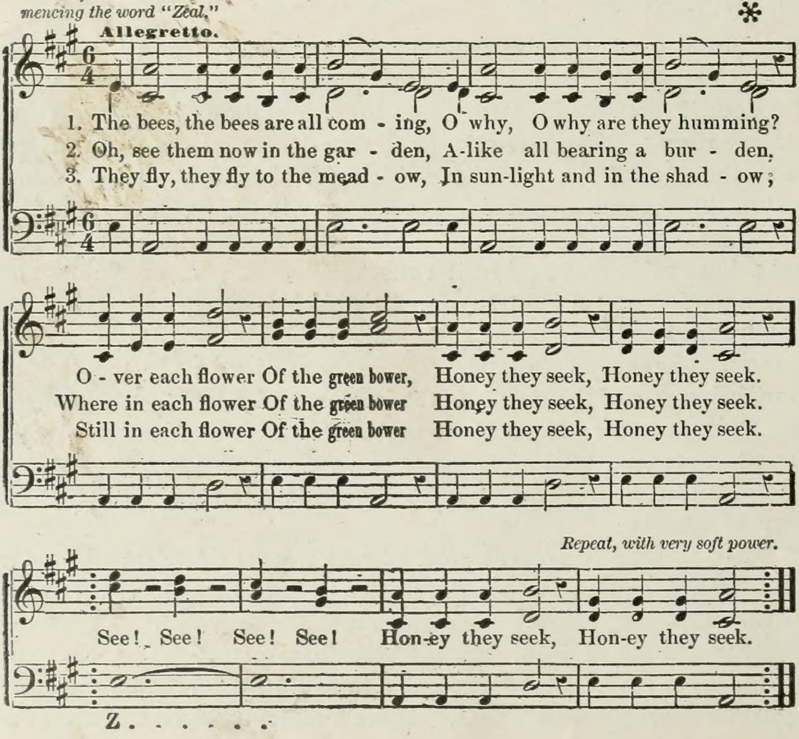
Don't you think it is a pretty heavy investment for the time they are in actual use? Ask some one to find out how many years his most expensive implements have been in use.

There are some who pay a little cash down and make a small payment each year. In one year from the last installment the dealer makes a new trade, taking in the first machine at a price that would not purchase half the raw materials for the new one.

The latest improvement, the newest attachment and the brightest paint and polish should not be permitted to argue too strongly for making new purchases.

The Honey Seekers.

At the letter Z, let the lower Alto make a continuous sound, with the teeth together, as if commencing the word "Zeal."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Allegretto.
1. The bees, the bees are all com - ing, O why, O why are they humming?
2. Oh, see them now in the gar - den, A-like all bearing a bur - den.
3. They fly, they fly to the mead - ow, In sun-light and in the shad - ow;
O - ver each flower Of the green bower, Honey they seek, Honey they seek.
Where in each flower Of the green bower Honey they seek, Honey they seek.
Still in each flower Of the green bower Honey they seek, Honey they seek.
Repeat, with very soft power.
See! See! See! See! Hon-ey they seek, Hon-ey they seek.
Z . . . . . .